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OPERATING EXPERIENCE WEEKLY SUMMARY

Office of Nuclear and Facility Safety

May 1 - May 7, 1998

Summary 98-18

Operating Experience Weekly Summary 98-18

May 1 through May 7, 1998

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EVENTS

1. CHEMICAL REACTION CAUSES BOTTLE TO RUPTURE

On May 1, 1998, at the Lawrence Livermore National Laboratory, a facility manager reported that an employee received chemical burns to his face when a plastic bottle pressurized, ruptured, and sprayed its contents. The employee washed his face and reported to health services for treatment. Health Services personnel directed the employee to shower, administered first aid, and released him. The employee later reported that his injuries were infected, causing him to seek additional medical attention and resulting in lost work time. Investigators determined that the bottle contained sulfuric acid, nitric acid, and acidified hydrocarbon oil and that the employee's lab coat, shirt, and safety glasses protected most of his skin. Mixing of incompatible materials resulted in an injury that could have been more serious had the employee not been wearing safety glasses. (ORPS Report SAN--LLNL-LLNL-1998-0025)Investigators determined that laboratory employees collected materials in the bottle for hazardous waste disposal. They determined that the bottle originally contained hydrogen peroxide and no one changed the label after it was emptied and the acids were placed in it. They also determined that, on March 31, an employee added acidified hydrocarbon oil to the bottle and stored it on a laboratory bench-top overnight. The employee was unaware that the bottle contained concentrated acids. Investigators determined that the injured employee noticed that the bottle was bulging when he entered the laboratory the following day, but it ruptured and sprayed its contents before he could take any action. The facility manager originally determined that the event was not reportable because Health Services personnel had released the employee to return to work. However, on May 1, a Chemistry and Materials Science Assurance Officer learned that the employee required additional medical attention and had lost work days because of the burns, so he determined that the event was a reportable occurrence. The facility manager continues to review this event.NFS has reported on incompatible chemical reactions in several Weekly Summaries. Following are some examples.

- Weekly Summary 97-29 reported a building evacuation at the Lawrence Livermore National Laboratory because of fumes generated from mixing a solution of nitric acid, hydrogen fluoride, and acetic acid with a solution of ethanol, hydrofluoric acid, and water. Investigators determined that the fumes resulted from a chemical reaction of incompatible materials being mixed for waste disposal by a technician. (ORPS Report SAN--LLNL-LLNL-1997-0037)

- Weekly Summary 96-40 reported that a researcher at the Oak Ridge Environmental Sciences Center was adding methanol to two vials containing sodium permanganate and polychlorinated biphenyls when an unexpected energetic reaction caused the mixture to spray from the vials. Approximately 1 milliliter of the mixture sprayed on the researcher's gloves. Investigators determined that an inadequate evaluation of chemical compatibility allowed the reaction to occur. (ORPS Report ORO--ORNL-X10ENVIOSC-1996-0001)

- Weekly Summary 95-52 reported the lessons learned from an event at the Oak Ridge K-25 Facility in which a 5-gallon plastic container ruptured because of internal pressure from a chemical reaction. Although no one was injured, the force of the reaction and parts from the plastic container created a hole in the wall nearest the container and in the ceiling directly above it. The explosion occurred as a result of mixing nitric acid, acetone, and other organic waste. Lessons learned from the event indicated that procedures must clearly identify the possibility of mixing incompatible materials and the actions needed to ensure segregation of the chemicals. (DOE Lessons Learned List Server Item Number Y-1995-OR-LMES-K25-1201, ORPS Report ORO--LMES-K25-GENLAN-1995-0003)

These events highlight the need for chemical workers to properly identify and understand the risks involved when working with hazardous chemicals. In facilities where hazardous chemicals are used, workers should be trained in the proper methods for handling, mixing, and storing these chemicals. Facility procedures should provide instructions concerning safe limits for mixing and chemical compatibility. It is important to keep records of the chemical types and quantities when mixing chemical wastes. Facility managers should emphasize the importance of researching all available sources of chemical safety information, particularly when performing first-time or infrequent operations.

Proper chemical disposal requires container contents to be clearly identified and documentation of their source to be readily available. National Research Council Publication ISBN 0-309-05229-7, *Prudent Practices in the Laboratory: Handling and Disposal of Chemicals,* 1995, points out that disposal facilities are prohibited from accepting materials whose hazards are unknown. Information about chemicals, chemical hazards, and chemical safety programs can be located on the DOE Office of Environment, Safety and Health, Office of Worker Safety, Chemical Safety Program Home Page. The home page is located at URL http://tis-hq.eh.doe.gov/web/chem_safety/. This home page provides links to many sources of information, including requirements and guidelines, lessons learned, chemical safety networking, and chemical safety tools. These events also highlight the need for comprehensive lessons-learned programs. Incompatible chemical mixing and overpressurization of containers have been reported many times throughout the DOE complex. One objective of investigating and reporting the cause of occurrences is to identify corrective actions to prevent recurrence and thereby protect the health and safety of the public, workers, and environment. DOE M 232.1-1, *Occurrence Reporting and Processing of Operations Information*, requires trending and analysis of occurrence information for early identification and correction of deteriorating conditions. The manual also requires dissemination of operations information, including lessons learned. Lessons learned are valuable only if the information they communicate is used. DOE-STD-7501-95, *Development of DOE Lessons Learned Programs*, was designed to promote consistency and compatibility across programs. Both lessons-learned managers and program managers should review the standard and incorporate applicable elements into their site programs. Managers, supervisors, and operators should review lessons-learned documents for applicability, and the information should be used to improve operations.

The following additional DOE and industry documents provide valuable guidance for all personnel who work with chemicals and hazardous materials.

- DOE-STD-1010-92, *Guide to Good Practices for Incorporating Operating Experiences*, states: "The use of experience gained should provide a positive method that a facility can use to improve their operations, making them efficient, cost-effective, and safe to the employees, the public, and the environment." Managers, supervisors, and operators should take advantage of available operating experience information and incorporate it as the standard suggests.

- DOE-HDBK-1100-96, *Chemical Process Hazards Analysis,* February 1996, and DOE-HDBK-1101-96, *Process Safety Management for Highly Hazardous Chemicals,* February 1996, provide guidance for DOE contractors managing facilities and processes covered by the Occupational Safety and Health Administration (OSHA) Rule for Process Safety Management of Highly Hazardous Chemicals (29 CFR 1910.119). Both handbooks are available on the Department of Energy Technical Standards Home Page at URL http://www.doe.gov/html/techstds/standard/standard.html.

- DOE Defense Programs Safety Information Letter, SIL 96-01, *Incidents from Chemical Reactions due to Lack of or Failure to Follow Proper Handling Procedures,* June 1996, provides guidance to prevent these incidents.

- DOE Defense Programs Safety Information Letter, SIL 96-05, *Compatibility Considerations in the Mixing of Waste Chemicals,* November 1996, addresses these issues and provides a guide to available information.

- 29 CFR 1910.1450, *Occupational Exposure To Hazardous Chemicals In Laboratories*, provides direction on the use of chemicals, including signs and labels; spills and accidents; basic rules and procedures; and training and information. 29 CFR 1910.1450 is available on the OSHA Home Page at URL http://www.osha-slc.gov/OshStd_data.

- National Research Council Publication ISBN 0-309-05229-7, *Prudent Practices in the Laboratory: Handling and Disposal of Chemicals,* 1995, section 7.B.3, "Collection and Storage of Waste," provides information and guidance for the accumulation and temporary storage of chemical wastes. The section also states that it is imperative to know the identity of all chemicals and understand their compatibility before mixing them. Information on how to order this book can be obtained from the National Academy Press, 2101 Constitution Avenue, N.W., Washington, DC 20418, (202) 334-3313.

- The Office of Environment, Safety and Health provides information in DOE/EH-0296, Bulletin 93-2, "Mixing of Incompatible Chemicals," February 1993, about the hazards associated with mixing of incompatible chemicals.

- DOE/EH-0557, Safety Notice 97-01, "Mixing and Storing Incompatible Chemicals," contains lessons learned related to the mixing and storing of incompatible chemicals. It also references a list of chemical incompatibilities provided by the University of Michigan. A copy of the chemical incompatibility list is available on the Internet at URL http://www.orcbs.msu.edu/chemical/chp/appendixc.html. Safety Notice 97-01 can be obtained by contacting the ES&H Information Center, (800) 473-4375, or by writing to U.S. Department of Energy ES&H Information Center, EH-72, 19901 Germantown Road, Germantown, MD 20874. Safety Notices are also available on the Operating Experience Analysis and Feedback Home Page at http://tis.eh.doe.gov:80/web/oeaf/lessons_learned/ ons/ons.html.

Article 2 provides additional information on hazardous waste characterization.

KEYWORDS: chemical reaction, pressurized, injury, labeling, acid

FUNCTIONAL AREAS: Materials Handling/Storage, Procedures, Research and Development

2. INCORRECTLY CHARACTERIZED WASTE RESULTS IN VIOLATION OF DOT REQUIREMENTS

On April 15, 1998, at the Hanford Pacific Northwest National Laboratory, Hanford waste management workers discovered waste that had been incorrectly characterized and shipped over public roads. The waste was shipped as non-RCRA (Resource Conservation and Recovery Act) regulated low-level radioactive waste (DOT Hazard Class 7) instead of corrosive waste (DOT Hazard Class 8). Investigators determined that the waste generator supplied incomplete data on the contents in one of two 5-gallon waste containers and that waste-sampling procedures were inadequate to accurately characterize the pH of the waste in both containers before shipment. Although there were no adverse consequences from this occurrence, incorrect waste characterization can result in wastes being handled improperly, which can result in personnel injury or environmental damage. Incorrect waste characterization can also lead to the potential for fines by regulating state and federal agencies (ORPS Report RL--PNNL-PNNLBOPER-1998-0004)

Biogeochemistry researchers generated low-level radioactive waste as a result of performing their research. Wastes included acidic aqueous wastes and organic scintillation counting waste commingled in 5-gallon “cubetainers.” A cubetainer consists of a polyethylene bladder inside a cardboard box with a screw cap opening that protrudes out of the top of the box. Researchers are required to record waste composition on the outside of the cardboard boxes as they add waste to the boxes. On October 15, 1997, a waste management field service representative supporting the biogeochemistry group used an approved procedure to agitate the contents of one of the cubetainers and measure the pH because the composition list indicated that the cubetainer contained acid. He determined that the pH was 6. The composition list for the other cubetainer indicated that it did not contain acid, so procedures did not require pH testing. The containers were classified as DOT Hazard Class 7 based on their pH and listed contents. On December 10, 1997, Laboratory waste management personnel shipped the cubetainers, along with similarly characterized wastes, over public roadways to the Laboratory hazardous waste storage facility. On December 11, 1997, Laboratory waste management personnel performed acceptance verification sampling including pH sampling of both cubetainers. They used a procedure that did not require agitation. They accepted both cubetainers for storage based on their sampling results and listed contents.

On April 15, 1998, Hanford waste management workers were performing random verification sampling when they discovered that the contents of one of the cubetainers was stratified into two distinct layers. Workers sampled both layers and determined that the bottom layer had a pH of less than 2, which required handling as corrosive RCRA-regulated mixed waste. Based on these results, the workers also sampled the second cubetainer received from the biogeochemistry group and determined that its contents were also separated into two layers, with the lower layer having a pH of less than 2. Investigators determined that a nitric acid component of the waste in one of the cubetainers was not recorded on the box when researchers added the acid. They also determined that both cubetainers contained roughly the same constituents and that sampling procedures were not adequate to identify and sample the separate stratified layers in the cubetainers. This led to sample results that were misleading. Investigators believe that the lower layer in the cubetainers was not characterized because testing methods were inadequate. Both the Laboratory and Hanford waste management groups are developing corrective actions to prevent recurrence. Corrective actions being considered include requiring waste generators to use transparent waste collection containers to allow easy verification of separated layers of waste.

NFS has reported on inadequate waste characterization in several Weekly Summaries. Following are some examples.

- Weekly Summary 98-11 reported that the DOE Office of Enforcement and Investigation issued a Preliminary Notice of Violation under the Price-Anderson Amendments Act to Lawrence Livermore National Laboratory for multiple failures to implement radiological protection requirements and provide the quality controls necessary to protect workers involved in High Efficiency Particulate Air (HEPA) filter shredding operations. Investigators determined that waste characterization data was available for the shredded HEPA filter, but it was incorrectly identified on the HEPA-filter waste storage box label and on the radioactive waste disposal requisition form. They also determined that no one confirmed the label accuracy or performed radiological surveys or additional characterization of the HEPA filter before it was shredded. (NTS Report NTS-SAN--LLNL-LLNL-1997-0001; ORPS Report SAN--LLNL-LLNL-1997-0038; DOE/OAK-540, Rev. 0, "Type B Accident Investigation Board Report of the July 2, 1997, Curium Intake by Shredder Operator at Building 513 Lawrence Livermore National Laboratory, Livermore, California,")

- Weekly Summary 96-19 reported that the facility manager of the Heavy Water Facility at the Savannah River Site reported the results of an investigation performed to determine the source of a tritium release at the Scientific Ecology Group in Oak Ridge, Tennessee. Solid Waste Facility shippers mistakenly shipped tritium-contaminated process waste filters and resins received from the Heavy Water Facility to the Scientific Ecology Group for compaction. Investigators identified the cause of the event as failure by Environmental Systems Engineering personnel at the Solid Waste Facility to specifically define or communicate the waste that should be included or excluded from the job control waste. (ORPS Report SR--WSRC-HWFAC-1996-0008)

This event underscores the importance of properly characterizing waste and clearly communicating the information to shippers and waste processors to ensure that hazardous and radioactive wastes are processed as required to prevent environmental release or personnel injury. When required, waste sampling methods should consider the possibility that the waste may be separated into layers. Waste materials and handling procedures should be well defined to eliminate confusion or the need for interpretation so that each person who generates, characterizes, packages, stores, or ships waste materials has the same understanding of the waste material requirements. Waste management requirements and guidance can be found in the following references.

- 40 CFR 262.11, *Hazardous Waste Determination*, states that waste may be characterized either by testing or by applying knowledge of the hazard characteristic of the waste in light of the materials or the processes used. Generator requirements for proper packaging and labeling of hazardous wastes are specified in 40 CFR 262.30-33, *Packaging and Marking*.

- DOE 460.1, *Packaging and Transportation Safety*, establishes safety requirements for packaging and transporting off-site shipments from DOE and for on-site transfer of hazardous materials. Hazardous material shipments are required to be in compliance with DOT hazardous materials regulations in 49 CFR 106-199, *Transportation*, and the applicable tribal, state, and local regulations not pre-empted by DOT.

- DOE 460.2, *Departmental Materials Transportation and Packaging Management*, establishes DOE policies and requirements to supplement applicable laws, rules, regulations, and other DOE Orders for materials transportation and packaging operations.

- National Research Council Publication ISBN 0-309-05229-7, *Prudent Practices in the Laboratory: Handling and Disposal of Chemicals*, 1995, provides guidance and recommendations regarding the safe handling and storage of chemicals, primarily in laboratory settings. Chapter 7.B.1, “Characterization of Waste,” recommends retaining waste in clearly marked containers and states that wastes must be defined clearly on the container. Physical descriptions should include the state of the material, the color, the consistency or viscosity, and the clarity. If the materials are layered, each layer should be described separately. Chapter 7.B.3, “Collection and Storage of Waste,” states that every container must be labeled to indicate the identity of the material and its hazard. Although the identity need not be a complete listing of all chemical constituents, it should enable knowledgeable laboratory workers to evaluate the hazard. Information on how to order this book can be obtained from the National Academy Press, 2101 Constitution Avenue, N.W., Washington, D.C 20418. This book can also be ordered from most larger book stores.

Article 1 provides additional information on hazardous waste characterization.

KEYWORDS: characterization, mixed waste, shipping, waste handling

FUNCTIONAL AREA: Materials Handling/Storage, Waste Management

PRICE-ANDERSON AMENDMENTS ACT INFORMATION

1. NONCOMPLIANCE TRACKING SYSTEM REGISTRATION

The Enforcement and Investigation Staff in the Office of Environment, Safety and Health has announced that a new Noncompliance Tracking System (NTS) will go on line on June 8, 1998. This system will continue to provide users with a centralized database for reporting and tracking potential violations of 10 CFR 820, *Procedural Rules for DOE Nuclear Activities.* DOE users who have read-write authority will be able to enter comments into reports contained in the database. Contractor users with read-write authority will be able to compose and submit NTS reports. After June 8, the old system will be disabled and users will only be able to access NTS through the new system. In order to gain or continue access, all users must register with the ES&H Information Center, even if they are registered under the current system. The registration form for the new system is very similar to the old one, with the following exceptions.

- Users will be asked to indicate whether they want read-write access or read-only access.
- Price-Anderson Amendment Act coordinators will be required to sign all registration forms.

The deadline for registration for NTS users requesting read-write authority is May 15, 1998. The registration form may be accessed through the Office of Enforcement and Investigation Home Page at http://tis-nt.eh.doe.gov/enforce/. Completed registration forms should be sent to the Information Center at (301) 903-0118. If you have any questions, contact Sue Petersen at (301) 903-0112.

KEYWORDS: computer, system

FUNCTIONAL AREAS: Licensing/Compliance, Technical Support

FINAL REPORTS

This section of the OE Weekly Summary discusses events filed as final reports in the ORPS. These events contain new or additional lessons learned that may be of interest to personnel within the DOE complex.

1. CIRCUIT BREAKER ELECTRICAL ARC CAUSED BY DESIGN DEFICIENCY

On March 6, 1998, at the Fernald Environmental Management Project, electricians preparing for an electrical system outage manually tripped a 480-volt circuit breaker and heard an unusually loud noise inside the breaker cubicle. They opened the cubicle door and observed smoke and flash burns inside the breaker. The electricians stopped work, ensured a hazardous condition did not exist, and made the proper notifications. They removed the breaker from service, examined it, and observed carbon tracks in the automatic-trip solenoid area. The breaker was a General Electric dashpot-type circuit breaker retrofitted with a Siemens electronic trip mechanism. Investigators determined that a design deficiency caused an electrical arc when metal tabs on the operating mechanism came into close proximity with grounded components before the breaker was fully open. There were no impacts on environment, safety, or health as a result of this occurrence. (ORPS Report OH-FN-FDF-FEMP-1998-0010)

Facility managers determined that the damaged breaker had been manually tripped without incident during previous outages. They also determined that there have been no electrical overloads that would automatically trip the circuit breaker. Investigators determined that the circuit breaker was refurbished about 10 years ago to maintain its serviceability and that it was retrofitted with a Siemens electronic trip unit that conformed to applicable engineering and performance specifications. Investigators determined that the operating mechanism used stored spring energy to facilitate manual or automatic opening of the breaker. They exercised the operating mechanism and discovered that the normal force of operation caused the metal tabs to come into close proximity to, but not actual contact with, the grounded components before the breaker was fully open. Investigators determined that the root cause was a deficient design because there was no insulating barrier to prevent electrical arcing between the metal tabs and grounded components. To prevent a recurrence, facility managers initiated a site-wide survey to identify all General Electric dashpot-type circuit breakers retrofitted with the Siemens trip mechanism. After all of these breakers have been identified, electricians will install 600-volt heat shrink tubing to serve as an electrical insulating barrier.

NFS recently reported events in Weekly Summaries concerning electrical design and installation deficiencies. Following are some examples.

- Weekly Summary 98-13 reported that an electrician at the Savannah River Site received second-degree burns to his hands and face when the manual trip button on a 480-volt breaker cracked and came apart, allowing the mechanical linkage to contact energized parts and cause an electrical arc and flash. An off-site physician treated the electrician’s burns, and the electrician returned to work the following day. The facility manager instructed electricians to de-energize and inspect similar breakers in the facility. Electricians found one other breaker with a damaged manual trip button. The site maintenance engineering manager issued a site-wide advisory directing personnel at facilities with similar breakers not to use the manual trip button. (SR--SRC-POD-1998-0002)

- Weekly Summary 98-03 reported that a loss-of-phase condition at the Los Alamos National Laboratory resulted in the failure of a size 5 Westinghouse motor control center for a critical exhaust fan in the Chemistry and Metallurgy Research Facility. The fan failed to shift from slow to fast speed when the fault occurred. Investigators determined that manufacturing defects and design problems resulted in arcing between the bus bars and the friction stabs on the circuit breaker for the fan motor. (ALO-LA-LANL-CMR-1998-0005)

This event illustrates that work should be stopped when an anomalous or unexpected event occurs, and the event should be evaluated. In this case, the electricians properly did not continue to work or disregard the indication of a potential problem. Also, the electricians immediately evaluated the condition of the breaker to ensure it was open and to rule out the existence of potentially hazardous equipment and facility conditions. Lessons learned also highlight that retrofitting equipment sometimes requires rigorous and thorough evaluation, inspection, and testing of the compatibility of components and their overall effects on operability. In this case the circuit breaker was retrofitted in conformance to applicable specifications and had a history of operation without incident. However, an overlooked design deficiency caused the energized metal tabs to come into close proximity with grounded components with no insulating barrier to prevent arcing.

Electrical equipment designers responsible for specifying the design and maintenance of circuit breakers should identify any General Electric dashpot-type circuit breakers retrofitted with the Siemens trip mechanism, or other trip mechanisms, to ensure that electrical arcing cannot occur during operation of the breaker.

KEYWORDS: circuit breaker, design deficiency, electrical arc, modification

FUNCTIONAL AREAS: Design, Electrical Maintenance, Modifications

2. INADEQUATE CONFIGURATION CONTROL RESULTS IN GASEOUS EFFLUENT MONITOR ERROR

On March 11, 1998, at the Idaho Chemical Processing Plant, facility personnel discovered that data from a main stack gaseous monitor was in error because monitor installers changed a sample point specified in the original design to one downstream of a vacuum relief valve designed to add atmospheric air to the stack sample flow. The original design sample point was on the suction side of the sample blower, upstream of the relief valve. Because the gaseous monitor pump was not strong enough to draw an adequate flow from this low-pressure point, monitor installers changed the sample point to the higher-pressure discharge side of the sample blower. However, they did not use existing site configuration control requirements when they changed the sample point. Facility personnel corrected release values and determined that they never exceeded release limits during operation of the stack with the gaseous monitor sample point in the wrong position. Inadequate configuration control could have resulted in an inability to detect excessive stack radiological emissions. (ORPS Report ID-LITC-WASTEMNGT-1998-0002)

The gaseous monitor monitors the stack release of iodine-129 and tritium to the atmosphere. The monitor draws a sample of stack effluent through activated charcoal, which adsorbs gaseous radionuclides. Personnel remove the activated charcoal periodically and analyze it for radiounclide content. Investigators determined that the location of the sample point resulted in the monitor indicating approximately one-half of the actual stack radiological emissions because air introduced by the vacuum relief valve diluted the sample stream. The relief valve bleeds in atmospheric air to provide enough airflow to keep the sample blower from overheating. They also determined that, because the monitor had never indicated more than one-sixth of the allowable stack radiological emissions, the actual emissions never exceeded one-third of the allowable emissions. Figure 2-1 shows a simplified schematic of the stack monitoring system.

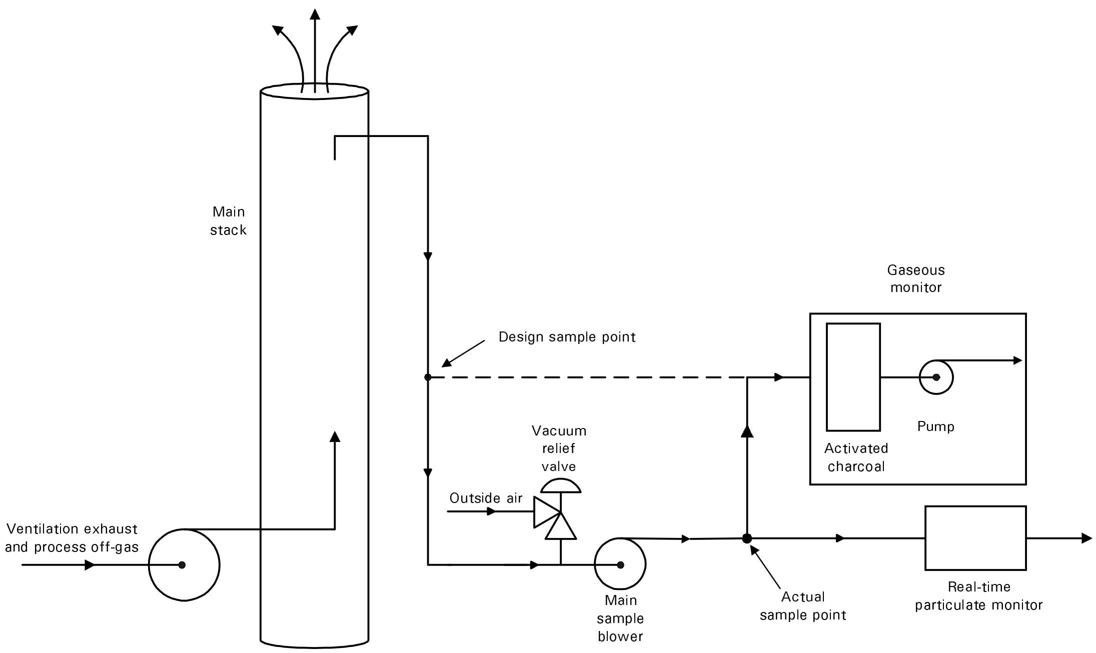

Figure 2-1. Simplified Schematic of Stack Monitoring System

The facility manager determined that the root cause of this event was that installers did not follow site configuration control requirements when they discovered that the original design of the monitor installation was inadequate. Corrective actions included using site configuration control requirements to select an appropriate sample point that meets the sampling requirements, plumbing the sampler to this location, testing the sampler for proper operation, and documenting all activities related to the design change.

NFS has reported on inadequate configuration control in several Weekly Summaries. Following are some examples.

- Weekly Summary 97-45 reported that facility personnel at the Hanford Site Plutonium Reclamation Facility discovered that electricians had locked out and tagged out the wrong motor control center because system drawings were incorrect. Investigators determined that this event occurred because the motor control center was modified and no one revised the drawings. (ORPS Report RL--PHMC-PFP-1997-0042)

- Weekly Summary 97-03 reported that all personnel at the Hanford Site Plutonium Finishing Plant evacuated in response to a criticality alarm caused by short-circuited, 24-volt dc wiring. An inadequately researched modification unnecessarily activated the criticality safety alarm and caused evacuation of a building. (ORPS Report RL--PHMC-PFP-1997-0003)

These events illustrate the importance of thorough technical reviews, documentation of modifications, and a disciplined configuration management program. Proposed modifications to any system need to be thoroughly reviewed for impact on the design basis and their effect on existing facility systems and processes. If a proposed design cannot be implemented in the field, work should be stopped immediately. If necessary, changes should be made to the work package using the approved change control process. Facility managers should ensure that all personnel are made aware of the need for detailed modification reviews and a stringent configuration management change control process, even for non-vital systems. The following references provide standards and requirements for configuration control.

- DOE-STD-1073-93, -Pt.1 and -Pt.2, *Guide for Operational Configuration Management Program, Including the Adjunct Programs of Design Reconstitution and Material Condition and Aging Management,* addresses modification technical reviews as part of the change control element. Section 1.3.4.2 of the standard recommends that the design authority review and approve changes before implementation. The section states that these reviews should be used to evaluate safety, environmental, and mission impacts. The standard also discusses the control of modifications that can lead to temporary or permanent changes in design requirements, facility configuration, or facility documentation. The standard discusses identifying changes, conducting technical and management reviews, and implementing and documenting changes.

- DOE 5480.19, *Conduct of Operations Requirements for DOE Facilities*, chapter VIII, "Control of Equipment and System Status," states that DOE facilities are required to establish administrative control programs to handle configuration changes resulting from maintenance, modifications, and testing activities.

KEYWORDS: configuration management, modification control, radiation monitoring

FUNCTIONAL AREAS: Configuration Control, Modifications